



# Excellence in Computing & IT



**South Craven School**  
SUPPORTED BY SOUTH CRAVEN ACADEMY TRUST

# Adult Excellence

## Knowledge

- Understand the fundamental principles and concepts of computer science and IT, including programming, abstraction, decomposition, logic, algorithms, data representation, CS & IT theory and hardware and software
- Understand the relationships between different aspects of computer science and IT
- Understand and articulate the individual (moral), social (ethical), legal and cultural opportunities and risks of digital technology

## Skill

- Think creatively, innovatively, analytically, logically and critically
- Apply the fundamental principles and concepts of computer science, including abstraction, decomposition, logic, algorithms and data representation
- Analyse problems in computational terms through the practical experience of solving problems, including writing programs to do so
- Can apply skills, knowledge and understanding to solve problems
- Use mathematics to express computational laws and processes and problem-solving in both theoretical and practical ways using: Boolean algebra, Algorithms, Data types and data structures, Number representations and bases



# Key Stage 5 Excellence

## Knowledge

- Understand the concept of data types including primitive and complex data
- Understanding data representation e.g. Binary, ASCII etc.
- Understand the need for and characteristics of a variety of programming paradigms Skills: Procedural, Object-Oriented, Functional and Logical
- Understand the importance of the efficiency of an algorithm; that this can be measured in terms of execution time and space requirements, and that the efficiency of algorithms that perform the same task can be compared
- Understanding of standard algorithms: input validation, find minimum, find maximum, count occurrences, linear search
- Understand the need for and functions of systems software
- Understand the characteristics of contemporary systems architectures, including processors, storage, input, output and their connectivity
- Understand the characteristics of networks and the importance of networking protocols and standards
- Understand the individual (moral), social (ethical), legal and cultural opportunities and risks of digital technology

## Skill

- Use databases to store, retrieve and manipulate data, including database programming and producing a data model
- Take a systematic approach to problem solving
- Design, write and test programs to either a specification or solve a problem
- Articulate how a program works, arguing for its correctness and efficiency using logical reasoning, test data, and user feedback
- Use abstraction effectively to appropriately structure programs into modular parts with clear, well documented interfaces
- Model aspects of the external world in a program using abstraction
- Apply computing-related mathematics to algorithms e.g. +, -, \*, /, ^, MOD
- Understand how to write specifications for a programming solution
- Demonstrate methods of capturing, selecting, exchanging and managing data to produce information for a particular purpose



# Key Stage 4 Excellence

## Knowledge

- Explain and use two - dimensional arrays (and higher)
- Explain the need for hexadecimal; two's complement, signed integers, and string manipulation
- Explain the need for data compression, and be able to describe simple compression methods
- Explain the need for analogue to digital conversions and how this works
- Explain the limitations of using binary representations - e.g. rounding errors, sampling frequency and fractional numbers
- Explain what compilers and interpreters are and do and give some examples of when they are used
- Explain routing; redundancy and error correction; encryption and security
- Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns

## Skill

- Successfully apply algorithms in solving GCSE level type problems
- Use hexadecimal; two's complement, signed integers, and string manipulation
- Successfully apply analytic, problem-solving, design, and computational thinking skills to solve Computing/Computer Science GCSE and A level type problems
- Successfully demonstrate their capability, creativity and knowledge in computer science, digital media and information technology projects
- Successfully identify project/task requirements from a given brief
- Use multiple idea generation techniques to identify solutions to a given brief



# Key Stage 3 Excellence

## Knowledge

- Understand several key algorithms that reflect computational thinking, e.g. ones for sorting and searching
- Understand simple Boolean logic [AND, OR and NOT] and some of its uses in circuits and programming
- Understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers, e.g. binary addition, and conversion between binary and decimal
- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- Understand how instructions are stored and executed within a computer system
- Understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits
- Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns

## Skill

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems
- Make appropriate use of data structures (lists, tables or arrays); design and develop modular programs that use procedures or functions
- Use logical reasoning to compare the utility of alternative algorithms for the same problem
- Create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users



# Key Stage 1 & 2 Excellence

## Knowledge

- Understand what computer networks are, including the internet
- Understand that networks can provide multiple services
- Understand that the world wide web is different from the Internet
- Understand the opportunities networks offer for communication and collaboration
- Understand what algorithms are
- Understand that algorithms are implemented as programs on digital devices
- Understand that programs execute by following precise and unambiguous instructions

## Skill

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems
- Solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to predict and explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- Can select and use a variety of software (including internet services), to collect, analyse, evaluate and present data and information
- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- Use digital technology purposefully to create, organise, store, manipulate and retrieve digital content
- Keep personal information private; use technology safely, respectfully and responsibly; recognise acceptable & unacceptable behaviour; identify a range of ways to report concerns about content or contact on the internet or other online technologies

